Electric field induced modification of Landau levels in Bernal stacked trilayer graphene.

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Abstract:

Bernal stacked trilayer graphene is a multiband system (monolayer-like and bilayer-like bands) where the application of a perpendicular electric field leads to interaction-induced effects and band modification [1][2][3]. We studied the effect of an electric field on the magneto transport properties of the high mobility graphite-gated and hexagonal boron nitride encapsulated Bernal stacked trilayer graphene. We observed multiple Lifshitz transitions through transport measurements at zero magnetic fields as we tuned the number density at high electric fields [4][5]. These we associate with changes in the fermi surface topology. Through magneto transport study, we explored the evolution of symmetry-broken states in the trigonal warped Dirac Gully regime. The formation of three dirac cones at each valley lead to three-fold degenerate states in the Quantum Hall measurement. We have also studied the evolution of the spin-split monolayer-like landau levels with the magnetic field at different electric fields. We find that interaction effects lead to substantial spin-splitting of the bands at finite displacement fields.

References

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[3] Koshino, Mikito, and Edward McCann,*Physical Review B* 79.12 (2009): 125443.
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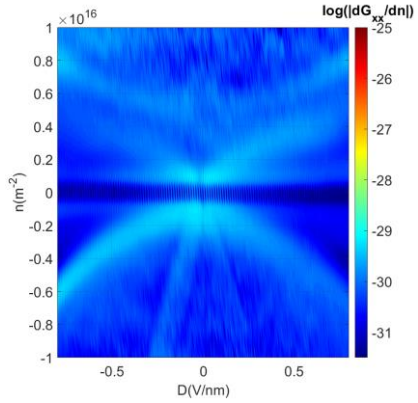
Figure



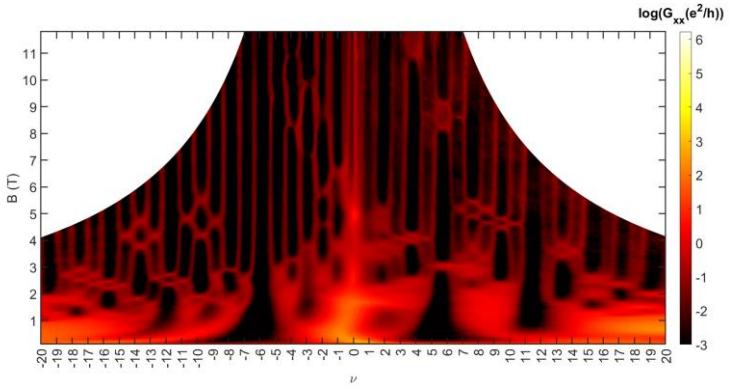


Figure 1: Number density versus Displacement plot at B=0 T.
Figure 2: Color plot of magnetic field and filling factor at the D=0.95V/nm.